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SUMEJ
Sumatera Medical Journal
Journal homepage: https://talenta.usu.ac.id/smj

Literature Review

Unveiling the Shadows: Understanding Urban Perspectives on Cervical Cancer

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ARTICLE INFO

Article history:
Received 20 June 2025
Revised 17 December 2025
Accepted 17 December 2025
Available online 1 January 2026

E-ISSN: 2622-1357
P-ISSN: 2622-9234

How to cite:
Sheetal Mahendher, Leonard L, Aprajitha R, "Unveiling the Shadows: Understanding Urban Perspectives on Cervical Cancer", SUMEJ, Vol. 09, No. 01, January 2026.

https://doi.org/10.32734/sumej.v9i1.21440

ABSTRACT

Background: Cervical cancer remains a significant public health concern in India, including urban regions like Bangalore, where awareness of HPV and its vaccination is still limited. Despite the availability of effective vaccines, uptake remains low due to misinformation, stigma, and inadequate health education. **Objective:** This study aims to assess the awareness, perceptions, and acceptance of cervical cancer vaccination among individuals aged 18 and above in Bangalore South, and to identify key barriers influencing vaccination uptake. **Methods:** A quantitative, inductive research approach was employed using a structured survey administered to 51 purposively selected participants. The survey captured awareness of HPV, vaccination, Pap smear screening, and prevalent myths. Descriptive statistics and Pearson's chi-square tests were conducted using SPSS to examine associations between demographic factors and vaccine-related attitudes. **Results:** Findings revealed substantial gaps in awareness and several misconceptions regarding HPV and vaccination. Chi-square results indicated no significant associations between awareness levels and age, gender, or income, while education showed a significant relationship with perceived vaccine safety. **Conclusions:** Despite urban residency, awareness and uptake of cervical cancer vaccination remain low. Targeted education, myth-busting campaigns, and improved accessibility are crucial to enhancing vaccination acceptance and preventing cervical cancer in urban communities.

Keywords: cervical cancer, hpv, infection, public health, pap smear, vaccination, vaccine myths

1. Introduction

Sexually transmitted infections (STIs) are initially developed by sexual contact and have a high rate of morbidity and mortality worldwide, affecting 50% to 70% of sexually active individuals [1]. Human papillomaviruses (HPVs) are a large and diverse group of epitheliotropic double-stranded DNA viruses [2]. According to a 2023 fact sheet by the WHO (World Health Organization) Information Centre on HPV (human papillomavirus) and Cancer, as many as 1,23,907 women in India are diagnosed with cervical cancer every year. As many as 77,348 women die from cervical cancer annually [3]. Cervical cancer is the second most frequent cancer among women in India, which contributes to one-fifth of the global burden [4]. The global burden from cervical cancer was far greater in developing nations than in developed nations that had implemented highly effective screening programs, which resulted in lower rates of cancer deaths [5].

Cervical cancer poses a notable public health concern, especially in urban areas like Bangalore, India. Despite medical advancements, many residents lack awareness about the disease, leading to delays in diagnosis

and treatment, which in turn affects survival rates. Understanding the importance of awareness in healthcare, it's crucial to assess how well urban populations in Bangalore understand cervical cancer and its prevention methods, including vaccination.

This study aims to explore how urban residents in Bangalore South perceive and understand cervical cancer vaccination. This survey aims to uncover the factors contributing to why fewer people are getting vaccinated against cervical cancer vaccination in urban areas. The goal is to identify what factors contribute to this low uptake, such as financial constraints, misunderstandings within society, and difficulties in accessing healthcare services.

By analysing how budgetary limitations, societal attitudes, and healthcare access intersect, this study seeks to uncover the complex challenges that hinder widespread cervical cancer vaccination in urban communities. Gaining this understanding enables the development of targeted strategies to address these barriers effectively. The insights derived from the study aim to equip policymakers, healthcare providers, and community leaders with practical guidance for strengthening awareness, improving accessibility, and promoting preventive healthcare measures in urban settings. By gaining this understanding, the goal is to equip policymakers, healthcare providers, and community leaders with practical insights to develop effective ways for addressing cervical cancer in urban settings.

In the landscape of cervical cancer prevention, several HPV vaccines have been introduced globally, offering protection against the strains most commonly linked to cervical cancer. Widely used vaccines such as Cervavac and Gardasil provide effective immunization and have been instrumental in reducing HPV-related disease burden [6,7]. These vaccines work by triggering an immune response through virus-like particles, ensuring strong protection against high-risk HPV types. Although multiple vaccine options exist, public awareness about them remains limited, especially in urban communities like Bangalore. This lack of understanding contributes to low uptake, despite the proven global success of HPV vaccination programs.

In the realm of public health, vaccination initiatives have yielded significant successes. A historic new study out of Scotland shows the real-world impact of vaccines against the human papillomavirus: The country has detected no cases of cervical cancer in women born between 1988-1996 who were fully vaccinated against HPV between the ages of 12 and 13 [8]. Similarly, the United Kingdom's implementation of vaccination programs for school-aged children, both boys and girls, resulted in a remarkable 90% reduction in cervical cancer cases over a decade [9].

the vaccination schedule usually consists of two doses for individuals between the ages of 9 and 15, and three doses for individuals aged 16 to 45. The vaccination schedule spans around six months, ensuring individuals receive their doses in a timely manner. While the vaccine's effectiveness might lessen as one gets older, the newer version, released in 2018, now allows individuals up to age 45 to receive it, making it more accessible to a wider range of people [10,11].

While vaccination serves as a primary preventive measure against cervical cancer, secondary prevention involves routine screenings, such as Pap smears. These screenings, recommended for individuals aged 21 to 65, entail a cost of approximately 1500 INR [12,13]. Combining Pap smear tests with HPV screenings extends the screening interval to every five years. Additionally, it's worth considering lifestyle elements like smoking, which have been pinpointed as notable factors influencing cervical cancer risk. This is because HPV, the virus is most commonly associated with cervical cance and is frequently transmitted through sexual activity, categorizing it as a sexually transmitted infection/disease (STI/STD) [1].

This research aims to contribute to better public health outcomes by increasing awareness and acceptance of cervical cancer vaccination among urban residents in Bangalore. By addressing knowledge gaps and overcoming barriers to vaccination uptake, The study aims to lay the groundwork for a healthier future for individuals impacted by this illness.

2. Methods

2.1 Literature Review

Understanding HPV

HPV comprises over 150 strains and is responsible for nearly 70% of cervical cancer cases, with types 16 and 18 accounting for most infections in India [14]. Transmitted primarily through intimate contact, HPV is linked not only to cervical cancer but also to other anogenital cancers. Although HPV vaccination cannot treat an existing infection [15], it is a critical preventive tool. However, misinformation and stigma continue to limit vaccine acceptance.

Research also highlights gender differences in vaccine attitudes: females generally show greater willingness to be vaccinated, while males exhibit higher hesitancy [16]. Historically, limited epidemiological data on men delayed vaccine recommendations for them, although Gardasil’s approval for male use in 2009 marked

significant progress [17]. Given that most sexually active individuals approximately 85% of women and 91% of men will contract HPV at some point [18], and considering men's higher lifelong exposure risk (Giuliano, 2014), expanding vaccination coverage is essential. Clinical evidence further shows reduced risks of HPV-related cancers among vaccinated male populations [19], underscoring that HPV affects all genders.

Cervical Cancer Vaccination - A crucial defence against a silent threat

In rural areas of India, cervical cancer is frequently encountered among women, while in urban settings, it ranks as the second most prevalent cancer among them. Prophylactic vaccination against HPV and screening and treatment of pre-cancer lesions are effective ways to prevent cervical cancer and are very cost-effective [3]. The disease claims more lives in India than any other country, highlighting the urgency for preventive measures. In India, the vaccine, available since 2018, proves effective for individuals between 9 and 45, with the cost of Rs. 2000 per dose. Vaccines like Cervarix (Rs. 2000 per dose) and Gardasil (Rs. 3000 per dose) offer protection against Human Papilloma Virus (HPV), which is a major contributor to cervical cancer. Critical to the development of the HPV vaccines, virus-like particles technology allowed for the mechanism to mimic HPV capsid proteins, thus producing neutralizing antibodies without actually including live HPV DNA in the vaccine [20]. The safety of the vaccine is widely recognized, and while rare, mild side effects like itching and soreness may occur. In India, the HPV vaccines have been authorized for use since 2008 for females from age 9 to 45 years, as approved by the National Technical Advisory Group on Immunization (NTAGI). The Indian Academy of Paediatrics Committee on Immunisation (IAPCOI) has recommended the vaccine for all the females starting from 9 years old. FOGSI recommends 9–14 years as the ideal time for vaccination, with vaccination of older age cohorts to be considered with an understanding that vaccination in sexually active females may be less effective as they may already be infected, but may provide some benefit against the types to which they have not been exposed earlier [4]. In a recent study conducted across multiple centers in India, researchers investigated the impact of both two and three doses of the qHPV vaccine. Their findings indicated that both dosing regimens were equally effective, showing no significant difference in immunogenicity. Even single-dose recipients showed a robust and sustained immune response however, it was inferior to that after two or three doses and the antibody levels were stable over a period of 4 years [21]. Researchers are conducting experiments to explore the potential of a one-shot vaccine option.

Pap smear - regular screening for women's health

The Pap smear test used as a screening method to detect cervical cancer is an effective way to prevent the development of cervical cancer, but awareness within the community about the Pap smear test is very low [13]. Screening with cervical cytology isn't practical in many developing nations because of the significant financial, technical, and infrastructural demands it entails. Consequently, alternative screening methods need to be explored, such as visual inspection with acetic acid (VIA), visual inspection with Lugol's iodine (VILI), and HPV testing [22]. According to WHO, Experts recommend that women undergo cervical cancer screening every 5–10 years beginning at the age of 30. For women who are living with HPV, screening is advised every 3 years starting at the age 25. There's a worldwide strategy suggesting minimum two screenings during a lifetime, utilizing a high-performance test at around 35 and 45 years of age. Primary prevention strategies encompass vaccination, while secondary prevention involves regular Pap smear screenings, recommended every three years for individuals aged 21 to 65, costing 1500 rupees. Combining Pap smear with HPV testing extends the screening interval to five years. A Pap screening done in association with an HPV DNA test increases the sensitivity for early detection of precancerous lesions [12]. The Pap smear test is a routine cancer screening method that should be done every 3 years, and a Pap smear with an HPV DNA test is recommended as a screening method every 5 years [23]. Cervical cancer typically manifests in women aged between 40 and 50 years, with precursor lesions often appearing 5–10 years prior. Therefore, it is recommended that women should have at least one Pap smear test before the age of 45 years [24].

Dispelling myths and ensuring access

Despite the vaccine's proven safety, misinformation persists, especially regarding its supposed side effects. The vaccine, primarily misunderstood due to its association with female sexuality, plays a critical role in preventing cervical cancer. There are studies that have debunked myths, assuring the public that the vaccine does not impact fertility. However, certain groups, such as pregnant and breastfeeding women, immunocompromised individuals, and recent transplant recipients, are advised against taking the vaccine.

These are the prevalent misconceptions articulated by interview participants that influenced their decision against vaccination.

Myth 1: There's no conclusive evidence yet that the HPV vaccine effectively stops cervical cancer.
Fact: the data and scientific evidence overwhelmingly support the fact that the HPV vaccine is highly effective in preventing not only HPV infections but also high-grade pre-cancerous lesions and cervical cancer itself. Several research have established the efficacy of the vaccine in lowering the chances of developing cervical cancer. By targeting the strains of the HPV which is linked to cervical cancer development, the vaccine has shown significant promise in reducing the risk, as evidenced by various studies. Additionally, long-term studies have shown a substantial decline in HPV infections and cervical pre-cancerous lesions among vaccinated individuals. Furthermore, the effectiveness of the HPV vaccine in preventing cervical cancer is supported by real-world data and population-level studies. While clinical trials primarily focused on HPV infection and pre-cancerous lesions rather than directly measuring reductions in cervical cancer, evidence indicates the vaccine's efficacy in preventing high-grade pre-cancers. Vaccination interrupts the natural progression of HPV-related diseases, reducing the risk of invasive cancer. In fact, studies have demonstrated noteworthy decreases in both cervical cancer occurrences and instances of high-grade pre-cancers post HPV vaccination.

Myth 2: HPV vaccines are unsafe and inadequately tested.
Fact: Numerous studies, comprising both clinical trials and post-licensure investigations, has contributed considerable evidence supporting the safety of HPV vaccines. Initial trials conducted before the vaccine's approval involved tens of thousands of participants and revealed that individuals receiving the HPV vaccine might experience more frequent injection-site reactions compared to those receiving a placebo. However, concerning systemic reactions like headaches and nausea, the rates were similar between the two groups. Importantly, there were no noticeable differences in the occurrence of autoimmune diseases between vaccine recipients and those given a placebo [11].

Following the vaccine's approval, ongoing safety evaluations have been carried out through surveillance systems like the Vaccine Adverse Events Reporting System (VAERS) and Vaccine Safety Datalink (VSD). These assessments have consistently found no signals indicating increased risks associated with HPV vaccination [25]. Although one study reported a higher incidence of fainting (syncope) following HPV vaccination, comprehensive analyses haven't revealed consistent links between HPV vaccination and severe outcomes like mortality, autoimmune diseases, neurological conditions, or premature ovarian insufficiency (POI) [26].

Additionally, extensive studies exploring the possibility of increased autoimmune disease risks post-HPV vaccination has yielded uncertain findings. No consistent patterns have been identified across different outcomes, timeframes, or vaccine doses [27]. In a study conducted by a large managed care organization in 2018, suggested that adolescent vaccine recipients don't face significantly higher risks compared to those who are not vaccinated.

Myth 3: Vaccinating at the age of 11–12 is too young and may encourage sexual activity.
Fact: The suggestion to administer HPV vaccination around ages 11–12 is backed by several reasons. One is the strong immune response typically seen at younger ages. Additionally, integrating HPV vaccination into the wider adolescent vaccine schedule makes it more accessible. Furthermore, administering the vaccine before engaging in sexual activity, when exposure to HPV is more probable, is another key factor supporting this recommendation.

- *Strong Immune Response in Younger Age Groups:* Studies conducted in clinical trials have revealed that encountering the HPV vaccine as early as age 15 leads to notably higher levels of HPV antibodies in comparison to vaccination at later stages of adolescence. These findings have prompted health experts to suggest two vaccine doses specifically for individuals under the age of 15 [10].
- *Sustained Immune Response and Protection:* Studies have demonstrated that HPV antibody levels persist for at least five to eight years after vaccination, with estimates suggesting protection for up to 20 years [7]. Even with declining antibody levels over time, vaccine-induced immunity remains significantly higher than that from natural HPV infection.
- *Integration into the Adolescent Vaccine Platform:* HPV vaccination is part of a series of vaccines recommended for adolescents, including tetanus, diphtheria, acellular pertussis, and meningococcal conjugate vaccines [28]. Administering these vaccines together can help improve HPV vaccine coverage.
- *Vaccination Before Sexual Activity:* It's widely understood in research that getting vaccinated against HPV before the onset of sexual activity is key to maximizing the vaccine's effectiveness. Studies show that a considerable number of teenagers start having sex before they even turn 15, with the average age for first onset of sexual intercourse being around 17 years old [29]. This underscores the importance of vaccinating

individuals before they become sexually active. It's a common misconception that because young people aren't yet sexually active, they don't need the HPV vaccine. However, this overlooks the fundamental purpose of vaccination, which is to prime the immune system before any potential exposure, thus lowering the chances of contracting the disease. It's important to note that HPV can spread through skin-to-skin contact, not just through sexual intercourse [6]. While less common, this mode of transmission underscores the need for early vaccination. Surveys and evaluations consistently demonstrate that vaccinated individuals are not more likely to engage in risky sexual behaviours compared to those who are unvaccinated [30].

Objectives Of The Study

- To explore and understand how people aged 18 and above in Bangalore South perceive and comprehend cervical cancer vaccination, focusing on why some may not be getting vaccinated.
- To examine how factors like income, and access to healthcare affect people's awareness and decision-making about cervical cancer vaccination, based on survey done by 51 individuals from diverse backgrounds.
- To suggest practical steps for improving awareness, education, and access to cervical cancer vaccination, drawing from insights gained through survey and analysis of existing research.

2.2 Rationale of the Study

The rationale behind conducting this study on cervical cancer vaccination stems from the pressing need to fill a crucial gap in knowledge regarding the perception and awareness of vaccination among individuals aged 18 and above in Bangalore Urban (South). Despite cervical cancer posing as a public health concern, especially in urban areas like Bangalore, there remains limited understanding about the attitudes and practices related to vaccination. This study employs an inductive reasoning approach and involves a sample size of 51 participants to delve into the public's understanding of the vaccine's existence, efficacy, and uptake rates. By analysing current Budget statements and examining prevailing perceptions, the research aims to uncover the spectrum of emotions and attitudes towards vaccination within the urban population. The findings are anticipated to shed light on various factors contributing to low awareness and uptake rates, including misinformation, inadequate education, societal stigma, and challenges related to healthcare access and affordability. Addressing these gaps in knowledge and understanding is crucial for developing targeted interventions aimed at increasing awareness and uptake rates of vaccination. Ultimately, the study seeks to inform policymakers, healthcare providers, and community leaders about the importance of combating cervical cancer and improving public health outcomes in urban communities like Bangalore.

2.3 Research Methodology

Data Source

This research utilized a quantitative approach, employing a survey methodology to delve into the awareness of cervical cancer vaccination among urban residents in Bangalore South. The target demographic comprised individuals aged 18 and above residing in the specified urban area. Due to the absence of a readily available list of potential participants, purposive sampling techniques were employed to ensure representation from diverse socioeconomic backgrounds, educational levels, and occupations within Bangalore South. This approach aimed to capture an understanding of cervical cancer vaccination awareness among residents in the urban setting.

Sample Frame

In line with the research objectives, no specific sample frame was established due to the unavailability of a comprehensive list of potential participants. Instead, purposive sampling methods were utilized to select participants from Bangalore South. The sampling unit constituted individuals aged 18 and above residing in the urban area, while the sampling elements encompassed residents from diverse backgrounds. This approach facilitated the inclusion of participants with varying perspectives and experiences related to cervical cancer vaccination, thereby enriching the dataset with a broad range of insights.

The Survey Instrument

The survey employed in this research was meticulously articulated to gather detailed insights into participants' awareness, beliefs, and experiences concerning cervical cancer vaccination. Structured questions were tailored to explore four key areas: Understanding HPV, Role of Vaccination/Cervical Cancer Vaccination, Pap Smear-Screening, and Dispelling Myths and Ensuring Access. The survey items were carefully crafted to capture detailed responses reflecting participants' understanding, viewpoints, and beliefs regarding cervical cancer vaccination. Prior to implementation, the survey instrument underwent rigorous validation processes, including

piloting with a subset of participants to ensure clarity, relevance, and cultural appropriateness. A 5-point Likert scale was utilized to gauge respondents' attitudes and perceptions, ensuring a comprehensive evaluation of their viewpoints regarding cervical cancer vaccination.

2.4 Analysis

The data analysis was conducted using both descriptive and inferential statistics, facilitated by Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics, including frequencies and percentages, were utilized to illustrate the demographic characteristics and attitudes of respondents towards cervical cancer vaccination. These statistics provided an overview of the distribution of responses across various demographic categories and belief statements related to vaccination. Inferential statistics, particularly Pearson's chi-square test, were employed to investigate associations between demographic variables and respondents' awareness, beliefs, and motivations regarding cervical cancer vaccination. The chi-square test was instrumental in uncovering meaningful connections between various demographic elements like age, gender, educational history, and monthly income—and how individuals view and approach vaccination. The findings were analyzed with a margin of error set at 5%, ensuring a careful examination of the data.

Descriptive Statistics

Demographic Information of the Respondents

The demographic details of the respondents, as presented in Table 1, indicates a total of 51 respondents. Regarding age distribution, the majority of respondents, accounting for 31 (60.8%), fall within the age group of 18-25 years. Following this, 9 (17.6%) respondents belong to the age group of 26-35 years, while 4 (7.8%) are in the age groups of both 36-45 and 55 and above. Additionally, 3 (5.9%) respondents fall into the age group of 46-55 years. The table also showcases a diverse educational background. The majority of respondents, constituting 30 (58.8%), hold Master's degrees or above. A significant portion, 18 (35.3%), possess Bachelor's degrees, while a smaller percentage, 3 (5.9%), have completed High School or below. Among these, 27 (52.9%) identified as female, while 24 (47.1%) were identified as male. In terms of occupation, 18 (35.3%) were employed, 27 (52.9%) were students, and 6 (11.8%) were unemployed. The majority of respondents, 15 (29.4%), reported a monthly income above 2,00,000 INR, followed by 15 (29.4%) reporting incomes less than 50,000 INR. Additionally, 8 (15.7%) fell within the income range of 50,000 - 1,00,000 INR, 7 (13.7%) fell within 1,50,000 - 2,00,000 INR, and 6 (11.8%) fell within 1,00,000 - 1,50,000 INR. All respondents were from Bangalore, as indicated by the location variable.

Table 1. Analysis of the respondents' traits through descriptive statistics

Variables	Categories	Frequency	Percentages
Age	18-25	31	60.8
	26-35	9	17.6
	36-45	4	7.8
	46-55	3	5.9
	55 and above	4	7.8
Gender	Female	27	52.9
	Male	24	47.1
Location	Bangalore	51	100.0
Educational Background	Bachelor's degree	18	35.3
	High School or below	3	5.9
	Master's degree or above	30	58.8
Occupation	Employed	18	35.3
	Student	27	52.9
	Unemployed	6	11.8

	1,00,000 - 1,50,000 INR	6	11.8
	1,50,000 - 2,00,000 INR	7	13.7
Monthly Income	50,000 - 1,00,000 INR	8	15.7
	Above 2,00,000 INR	15	29.4
	Less than 50,000 INR	15	29.4

Inferential Statistics

a) Test for Association between Awareness of Vaccine, Myths about Vaccine, HIV and HPV are the same, HPV is responsible for other cancers as well and Age

This analysis is conducted to investigate the potential influence of age on awareness and beliefs regarding HPV vaccines and related myths, including perceptions about the relationship between HIV and HPV, and the association between HPV and other cancers. Understanding these associations can inform targeted interventions and educational campaigns aimed at specific age groups to improve awareness and knowledge about cervical cancer prevention.

Table 2. Association between Item and Age

Demographic Variable	Item	Pearson Chi-Square	p-Value
Age	I am aware of HPV Vaccines	21.346	0.166
	I am aware of myths about HPV Vaccines	18.689	0.285
	I think HIV and HPV are the same	15.203	0.51
	I think HPV is responsible for causing other cancers as well	24.274	0.084

The analysis in Table 2 presents findings from a chi-square test examining the relationship between age and awareness/knowledge of HPV vaccines. Results indicate that there is no significant association between age and awareness of HPV vaccines ($p = 0.166$) or awareness of myths about HPV vaccines ($p = 0.285$). Similarly, age does not significantly influence the belief that HIV and HPV are the same ($p = 0.510$). While the association between age and the belief that HPV is responsible for causing other cancers is not statistically significant ($p = 0.084$), the p-value is close to the significance level, suggesting a borderline result. Overall, the data do not provide strong evidence to conclude that age significantly impacts awareness and beliefs about HPV vaccines and related myths.

b) Test for Association between Awareness of Vaccine, Motivation to get vaccinated, HIV and HPV are the same, Belief on males getting vaccinated, HPV vaccines are safe, Pap Smear Test and Gender.

This analysis is conducted to assess potential associations between demographic factors and various aspects of cervical cancer vaccination awareness, motivations, and beliefs, aiding in targeted intervention strategies and policy-making to enhance public health education and uptake of preventive measures.

Table 3. Association between Item and Gender

Demographic Variable	Item	Pearson Chi-Square	p-Value
Gender	I am aware of HPV Vaccines	0.687	0.953
	Motivation to get vaccinated	1.745	0.783
	I think HPV and HIV are the same	3.179	0.528
	I believe males can get the vaccination too	5.368	0.252
	I think HPV vaccines are safe	2.558	0.634
	I have heard of Pap Smear Screening	1.334	0.856

The analysis in Table 3 investigates the association between gender and various aspects of cervical cancer vaccination awareness and beliefs. Findings reveal no significant differences based on gender in awareness of HPV vaccines ($p = 0.953$), motivation to get vaccinated ($p = 0.783$), belief that HPV and HIV are the same ($p = 0.528$), belief that males can receive vaccination ($p = 0.252$), perception of HPV vaccine safety ($p = 0.634$), or awareness of Pap smear screening ($p = 0.856$). Overall, gender does not appear to substantially influence perceptions and beliefs related to HPV vaccination and Pap smear screening.

c) Test for Association between Awareness of Vaccine, Awareness of cervical cancer, HIV and HPV are the same, pap Smear screening is essential for early detection, HPV vaccines are effective, Myths of HPV Vaccine and Educational Background.

This analysis is conducted to explore potential associations between educational background, and awareness and beliefs regarding cervical cancer, HPV vaccines, and related topics. Understanding these associations can help tailor educational efforts and public health interventions more effectively.

Table 4. Association between Item and Educational Background

Demographic Variable	Item	Pearson Chi-Square	p-Value
Educational Background	I am aware of HPV Vaccines	7.174	0.518
	I have heard of cervical cancer before	12.049	0.149
	I think HPV and HIV are the same	4.541	0.805
	I think HPV Vaccines are safe	17.381	0.026
	I believe Pap smear screening is essential for early detection	5.614	0.69
	I believe HPV vaccines are really effective in preventing cervical cancer	10.833	0.211
	I'm aware of myths about HPV Vaccines	10.265	0.247

The analysis in Table 4 investigates the associations between educational background and various factors related to HPV vaccines, cervical cancer awareness, and related beliefs yields the following insights. Educational background does not significantly impact awareness of HPV vaccines ($p = 0.518$) or cervical cancer ($p = 0.149$), nor does it influence beliefs about the similarity between HPV and HIV ($p = 0.805$), the importance of Pap smear screening ($p = 0.690$), belief in HPV vaccine effectiveness ($p = 0.211$), or awareness of myths about HPV vaccines ($p = 0.247$). However, a significant association is found between educational background and the perception of HPV vaccine safety ($p = 0.026$), suggesting that educational attainment may influence perceptions of vaccine safety. Overall, while educational background plays a limited role in some aspects of cervical cancer vaccine and cervical cancer awareness, it appears to have a more pronounced effect on perceptions of vaccine safety.

d) Test for Association between Financial Constraints, Received the Vaccination, Motivation to get vaccinated and Monthly Income

This analysis is conducted to identify the association between financial constraints, vaccination status, motivation for vaccination, and monthly income and to explore potential disparities in access to HPV vaccination services based on socioeconomic factors.

Table 5. Association between Financial Constraints, Received the Vaccination, Motivation to get vaccinated and Monthly Income

Demographic Variable	Item	Pearson Chi-Square	p-Value
Monthly Income	Financial constraints have hindered my access to HPV Vaccine	9.764	0.879
	I have received an HPV Vaccination	7.421	0.492
	Motivation to get vaccinated	17.568	0.35

The analysis in Table 5 investigated associations between monthly income and various aspects of HPV vaccination. Results indicate no significant relationship between monthly income and perceptions of financial constraints hindering HPV vaccination access ($p = 0.879$), receiving an HPV vaccination ($p = 0.492$), or motivation for vaccination ($p = 0.350$). Thus, the data suggest that monthly income does not significantly influence these aspects of HPV vaccination behaviour.

3. Discussion

The insights from the analysis underscore the critical importance of understanding HPV and cervical cancer vaccination, revealing prevalent misconceptions and highlighting the urgency for targeted strategies to improvise awareness and combat misinformation. Considering the demographic details of the respondents, such as age, education, occupation, and income, it becomes evident that these factors shape perceptions and behaviours related to HPV vaccination. To address these challenges effectively, tailored interventions must be developed, having diverse communication channels such as social media, community outreach, and guidance from healthcare providers. Collaboration with educational institutions, community organizations, and advocacy groups is essential, particularly in disseminating accurate information among younger demographics. Additionally, investing in research to comprehend vaccine hesitancy and customize interventions accordingly is crucial for increasing awareness and uptake rates. Taking a holistic approach that incorporates education, community involvement, engagement with healthcare providers, and continuous research endeavours can help combat misunderstandings about HPV. This collective effort aims to emphasize the importance of vaccination in preventing HPV-related diseases.

4. Conclusion

This research delivers valuable insights into the perceptions and comprehension of cervical cancer vaccination among individuals aged 18 and above residing in Bangalore South, India. Despite being in an urban environment, many respondents demonstrate limited awareness of cervical cancer vaccination, leading to low uptake rates. The study identifies misinformation, inadequate education, and societal stigma as significant barriers to vaccination. Additionally, challenges related to access to healthcare services and affordability further impede vaccination rates. Examining the influence of factors such as income and access to healthcare on awareness and decision-making regarding cervical cancer vaccination among a diverse sample of 51 individuals underscores the complex interplay between socioeconomic factors and health behaviour. The study highlights the urgency for specific interventions to address these barriers and enhance awareness, education, and access to cervical cancer vaccination. Drawing from the survey results and analysis of existing research, practical steps are suggested to improve awareness, education, and access to cervical cancer vaccination. These steps include implementing educational campaigns to dispel myths and misinformation, enhancing healthcare infrastructure to improve access to vaccination services, and addressing socioeconomic disparities that impact vaccination uptake.

This research underscores the urgency of addressing the barriers to cervical cancer vaccination in urban communities like Bangalore South. By addressing misconceptions, enhancing education, and improving accessibility, we can effectively combat cervical cancer and improve public health outcomes. This research urges policymakers, healthcare providers, and community leaders to take proactive steps in promoting preventive healthcare and overcoming obstacles to vaccination. By doing so, they can contribute to fostering a healthier future for everyone impacted by cervical cancer.

5. Funding

No funding in this research/study.

6. Conflict of Interest

Authors declares no conflict of interest.

Limitations and Future Research

This research encounters a challenge due to its limited number of participants, comprising only 51 individuals. Such a small group may restrict the ability to apply the findings to a broader population in Bangalore South Urban. Therefore, it's crucial to approach the results with care. To overcome this constraint, future studies should aim to include a larger and more varied sample. This broader approach will provide a more thorough insight into the awareness of cervical cancer vaccination in urban settings.

Future research should compare vaccination awareness and uptake across demographic groups in Bangalore Urban, examining how age, gender, education, and socioeconomic status influence awareness and

acceptance. Longitudinal studies can track changes in awareness and uptake over time, offering insights into the effectiveness of public health interventions. Future efforts should prioritize interventions like community education, healthcare provider training, and policy changes to enhance vaccination rates. Evaluating the impact of these interventions will be crucial for shaping future public health strategies in urban areas like Bangalore South.

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